A REVIEW OF HINDE'S ANNELID JAWS FROM THE CINCINNATIAN OF CANADA

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The first extensive study of scolecodonts, fossil polychaete annelid jaws, was made by Dr. George Jennings Hinde in 1879. The jaws are from three different localities in the Cambro-Silurian (Cincinnati group), Silurian (Clinton and Niagara groups), and the Devonian (Hamilton group) in Canada, and from the lower Carboniferous in Scotland, according to Hinde. Exact geographic localities are not given. It is mentioned in the paper that the specimens were collected in Toronto and its immediate vicinity, from Dundas and Riviére au Sable in Ontario, and from the limestone quarries at Cults in Fifeshire, Scotland. In this paper the Canadian Cincinnatian forms from Toronto are re-examined.

Dr. Hinde in his paper reviewed the sparse literature, mentioned the formations in which the jaws were found, discussed the principal forms of the jaws, and compared them to the jaw-apparatus of existing annelids.

In an examination of the type specimens it was found that in most cases the illustrations did not compare well with fossil jaws. It is apparent that a delineator prepared the drawings and that Hinde used the figures for the descriptions and not the specimens. One must remember, however, that this was the first extensive study made of fossil annelid jaws and that Hinde could not benefit from the experience and mistakes of others. Also, the equipment used may not have been too precise.

Most of the specimens described in the paper are in the matrix and in some cases two-thirds of the jaw is concealed. Often a description was based only on the outer denticle-bearing margin. These forms could actually belong to any of several genera. Both sides of a jaw should be seen, in most cases, to warrant a description. In a later paper, Hinde (1882) recognized the desirability of being able to observe, study, and figure the complete jaw.

A new species of *Leodicites* is described herein.

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Genus and Species Indeterminate

Eunicites varians (Grinnell), Hinde, 1879: 375, 376; pl. 18, figs. 2, 3, 5.
Eunicites contortus Hinde, 1879: 375; pl. 18, fig. 4.
Eunicites perdentatus Hinde, 1879: 375; pl. 18, fig. 6.

Hinde (1879) discussed three similar species in which only the outer edge of the jaw bearing the denticles is visible. Most of the jaw of each specimen is concealed in the matrix, which makes identification impossible: they could belong to any one of several genera.

Genus and Species Indeterminate

Eunicites simplex Hinde, 1879: 376; pl. 19, fig. 2.

An examination of the type specimen shows it to be only a fragment of a jaw, quite unidentifiable.

Genus and Species Indeterminate

Eunicites gracilis Hinde, 1879: 376; pl. 19, fig. 3.

This specimen is not usable, since it is broken and partly covered.

Genus *Oenonites* Hinde, 1879
Oenonites curvidens Hinde

Oenonites curvidens Hinde, 1879: 376; pl. 18, fig. 7.

The illustration of this species does not correspond to the type specimen very closely. The anterior area including the well rounded fang is broad and the outer margin incurves at two places before it forms a rounded bight. The thirteen denticles including the fang on the free margin are triangular and conical in shape and are much larger than depicted in the drawing. The exposed surface of the jaw is slightly concave and does not have a ridge as shown in the illustration.

Oenonites inaequalis Hinde

Oenonites inaequalis Hinde, 1879: 376; pl. 18, fig. 8.

This form is too badly broken to determine very many of its details. The illustration shows three small teeth just posterior to the fang. These do not exist in the type specimen. Possibly part of the jaw has been broken away since the original drawing was made. Even so, these denticles seem to be rather unnatural. Perhaps they were just broken edges that were drawn in by the delineator as teeth. Most of the outer margin is apparently missing but it is possible that the margin continues from the broken projection to a point somewhere at the posterior end of the jaw.

Oenonites serratus Hinde

Oenonites serratus Hinde, 1879: 376; pl. 18, fig. 9.

The type and a duplicate specimen are both incomplete and partly hidden in the matrix. This is especially true of the outer side of the jaw. The denticles as illustrated do not compare to those of the specimens. The first four teeth are small and rounded and the remaining ones are minute and decrease in size posteriorly.

Oenonites rostratus Hinde

Oenonites rostratus Hinde, 1879: 376; pl. 18, fig. 10.

Most of the outer margin and posterior end are missing. The illustration does not correspond very closely to the type specimen. The fang is not as stout as shown by the drawing and the next four teeth are longer and more hooked. The remaining denticles, of which there are eight and not five, are much longer, sharper-pointed, and have a space between them.

Oenonites cuneatus Hinde

Oenonites cuneatus Hinde, 1879: 377; pl. 18, fig. 11.

Only the fang and the margin bearing the denticles is present on the type specimen. It is not possible to know if the outer side of the jaw bears a shank. The drawing of the form is shown as complete but it is possible that the artist's curved line does not represent the true contour between the fang and the posterior extremity. The fang is fairly well depicted but the denticles of the specimen do not correspond very closely to the figure.

Genus *Arabellites* Hinde, 1879

?Arabellites hamulus Hinde

Arabellites hamulus Hinde, 1879: 377; pl. 18, fig. 12.
Arabellites cornutus Hinde, 1879: 377; pl. 18, figs. 13, 14, 15.

The figures do not resemble the type specimens in a number of ways. Figure 15 cannot be used, since the specimen is badly crushed; or it may not be the one originally used. In all the specimens the fang is not narrow but wide and more curved. The number of denticles is probably 12 and the inner margin of each specimen is curved and not straight as illustrated. Nine denticles are present on the inner margin of Figure 12 but no doubt there were two or three more where a portion of the posterior end of the jaw is missing. The drawing does not show this broken area. Figure 13 has 12 denticles, not 13 as depicted. The space between the fang and the first denticle of Figure 14 is greatly exaggerated. The

denticles of this specimen have space between them, are larger, and more hooked backward than shown in the illustration. On the outer margin of Figures 12, 13, 14, and a duplicate specimen. A2156, Paleontology Section, British Museum (Natural History), is a broken area that suggests the presence of a shank. This missing part is more pronounced on the specimens than is shown in the figures. Species of *Arabellites* do not have a shank on the outer margin. For this reason the genus is questioned. This structure, however, may be just a small protuberance and not constitute a true shank. There is evidence on the type specimens and the duplicate of a tubercle at the truncate posterior margin.

Arabellites cuspidatus Hinde

Arabellites cuspidatus Hinde, 1879: 378; pl. 18, fig. 19.

An examination of the type specimen shows the form to be more rounded in outline and not angular as depicted in the illustration. The margin from the fang to the denticles is gently curved. The margin bearing the denticles is fairly straight but curves at the posterior end. The outer margin is curved outward slightly from the fang and then incurved about midway. From this area the margin curves outward and then incurves slightly to the posterior end. The illustration depicts the posterior margin as nearly straight, but examination of the type specimen shows it to be irregularly curved. Hinde, in the description, writes that there is a depression in the posterior portion. Actually this depression is a ridge and it emphasizes a concave area between it and the denticles. It could easily be mistaken as a ridge in the figure and it is possible that Hinde described the form from the illustration and not from the specimen.

Arabellites ovalis Hinde

Arabellites ovalis Hinde, 1873: 378; pl. 18, fig. 16.

There is too much missing from the specimen to warrant description. It is also very badly broken and the illustration does not correspond very closely to what is left of the specimen. The fang in the illustration seems to be unnatural.

Arabellites gibbosus Hinde

Arabellites gibbosus Hinde, 1879: 378; pl. 18, fig. 21.

Except for certain details it would be very difficult to find a likeness between the illustration and the type specimen. Probably a considerable part of the posterior end is missing. If it were present, the posterior would be truncate and not acute. The illustration shows the fang to be

about one-third the length of the jaw. Actually, nearly half the jaw consists of a wide, broadly curved fang. There are twelve or thirteen triangular, sharp-pointed, backward-directed denticles that extend nearly to the end of the jaw. The outer margin is incurved about midway and then gently curves to the posterior end. The illustration depicts the inner margin bearing the denticles as straight and continuing from the fang. The inner margin actually is not straight but a broad curve.

Arabellites ascialis Hinde

Arabellites ascialis Hinde, 1879: 378; pl. 18, fig. 17.

This form is too fragmentary to warrant description. The illustration does not compare very closely to the specimen, especially in the rendering of the fang.

?*Arabellites obliquus* Hinde

?*Arabellites obliquus* Hinde, 1879: 379; pl. 19, fig. 15.

This specimen is too incomplete to warrant description.

Arabellites rectus Hinde

Arabellites rectus Hinde, 1879: 378; pl. 10, fig. 18.

So much of the jaw is missing that no identification, description, or comparison of it will be attempted.

Arabellites sulcatus (Hinde)

Glycerites sulcatus Hinde, 1879: 380; pl. 19, fig. 1.

Hinde defined the genus *Glycerites* as "Jaws consisting of a simple curved hook with a wide base, without smaller teeth, resembling those of the existing genus *Glycerites*." Only one side of the figured specimen can be observed but it is fairly certain that a row of denticles is hidden in the matrix along the inner margin. The illustration differs in accuracy in many respects when compared with the type specimen. For instance only the upper part of the crooklike structure is present on the surface of the specimen. Actually, three-quarters of the surface consists of a deep-to-shallow fossa. The margins of the fossa are thickened and rounded except at the posterior end and part of the outer margin. At about the mid-area the outer margin is extended outward slightly to form a long but narrow shank or flange. The anterior margin of this projection is thickened and rounded and continues across the jaw as part of the anterior margin of the fossa. This structure forms a notch with the outer margin, at about one-third the distance from the end of the hook. Adjacent to the thickened outer margin the fossa is concave and then becomes a broad ridge that extends nearly to the posterior end.

Along the thickened inner margin the fossa is deeply concave and at the bottom of this deep recess is a suggestion of round cavities that are probably evidence of the hollow denticles that are likely to be situated on the other side of the jaw. The narrow area between the margin of the fossa and the inner margin is concave. The posterior end of the jaw is not round, as shown in the illustration, but obliquely truncate. This form is similar to a number of species of *Arabellites*. *Arabellites contractus* Hinde (1862), *Arabellites oviformis* Eller (1940), *Arabellites rectidens* Eller (1940), *Arabellites perpensus* Eller (1942), and *?Arabellites doutti* Eller (1945) resemble *Arabellites sulcatus* (Hinde) (1879) in a general way.

Genus *Nereidavus* Grinnell, 1877

Nereidavus major (Hinde)

Eunicites major Hinde, 1879: 374; pl. 18, fig. 1.

It is possible that the denticles extend the full length of the jaw but are hidden in the matrix. The first two denticles are not as sharp-pointed as shown in the illustration and the series resembles somewhat those of *Nereidavus ineptus* Eller (1942). The fossa is more evident than depicted in the drawing and is similar to *Nereidavus procurvus* Eller (1942).

Nereidavus dactylodus (Hinde)

Lumbriconereites dactylodus Hinde, 1879: 389; pl. 18, fig. 20.

Although the illustration does show that this specimen is not in perfect condition, there are some differences between the type specimen and the details of the delineation. The denticles, for instance, are in a continuous line and are oblique to the surface of the jaw. At the middle of the jaw is a convex area which slopes gently to the posterior and becomes a flattened or slightly concave surface. It is not as abrupt in its contour as depicted in the drawing. This depressed area is probably a reflection of the fossa on the other side of the jaw. *Nereidavus ineptus* Eller (1942) is very similar to *Nereidavus dactylodus* (Hinde) and may be the same species. The differences are mostly in the width of the flange on the inner margin and the shape of the protuberance on the outer margin.

Genus *Leodicites* Eller, 1940

Leodicites **innesi,** new species

Arabellites lunatus Hinde, 1879: 378; pl. 19, fig. 5.

In outline the jaw is subtriangular. Along the crescent-shaped inner

margin a series of large, sharp-pointed, conical, backward-directed denticles extends nearly to the posterior end. The first two denticles are broken and appear in the illustration as small teeth. Actually, they were probably large. The third denticle is also larger than depicted and there is space between all the teeth. The denticles decrease in size gradually to the posterior end. All the teeth are nearly at right angles with the surface of the jaw. The anterior margin incurves slightly and then curves broadly to form a shank. The outer margin is wide, crescent-shaped, and is not as straight as shown in the illustration. The posterior tapers to a narrow end but is not sharp-pointed. The fossa faces the matrix and is probably large and shallow.

While species of this genus are very common, none seems to compare very closely to this form. Hinde (1879) described this jaw as *Arabellites lunatus*. The denticles and the shank are dissimilar in the type specimens.

Leodicites lunatus (Hinde)

Arabellites lunatus Hinde, 1879: 378; pl. 19, fig. 4.

There are a number of differences between the type specimen and the illustration. The anterior margin and the margin of the shank are incurved and not straight. The first and second denticles are fairly long, sharp-pointed, hooked and point in a forward direction. The remaining denticles are sharp-pointed, backward-directed and oblique to the surface of the jaw. There is more space between the teeth than shown in the figure. The bight between the shank and outer margin is not so open as illustrated. The posterior is narrow but does not end in a sharp point.

Leodicites cristatus (Hinde)

Arabellites cristatus Hinde, 1879: 378; pl. 19, fig. 7.

Except for some details, the illustration resembles the type specimen rather closely. The denticles are much larger and more hooked than depicted. In fact, the interesting part about this species is the large size of the teeth as compared to the jaw. The shank is longer than is shown in the figure. *Leodicites exilis* Eller (1940) is similar in shape to *Leodicites cristatus* (Hinde).

Leodicites crenulatus (Hinde)

Arabellites crenulatus Hinde, 1879: 379; pl. 19, fig. 9.

There is very little resemblance between the illustration and the type specimen. This is especially true for the curve of the anterior margin, the depth and conformation of the bight, the form of the shank, and the

shape and plan of the denticles. The jaw is subtriangular in outline and wide anteriorly, and tapers to an acute posterior end. The anterior margin is incurved and forms a narrow shank that is directed slightly forward. A shallow rounded bight is present on the outer margin. A series of eight, sharp-pointed, well-hooked denticles extends the full length of the jaw. A wide, rounded space is present between each tooth. This species is similar to a number of forms described under the genus *Leodicites*.

Genus *Paleoenonites* Eller, 1942

Paleoenonites quadratus (Hinde)

Arabellites quadratus Hinde, 1879: 379; pl. 18, fig. 14.

Except for some details the illustration is similar to the type specimen. The anterior margin is not as straight as depicted in the drawing but curves abruptly in a forward direction to form the first denticle. The shank is not straight but curves gently backwards. The posterior margin is rounded and there is no evidence of the spur-like projection shown by the illustration. An examination was made to determine whether there was a broken place along the margin and whether the object had disappeared since the illustration was made. No broken place was found. The first denticle is very sharp-pointed and is directed backwards. The remaining denticles are flat, more prominent than shown in the illustration, and increase in size to about the middle of the free margin, then decrease in size to the posterior. A number of species of *Paleoenonites* are similar to *Paleoenonites quadratus* (Hinde).

Paleoenonites scutellatus (Hinde)

Arabellites scutellatus Hinde, 1879: 379; pl. 19, fig. 16.

With the exception of certain details the illustration is similar to the type specimen. The anterior margin is more incurved from the shank than shown in the drawing. It also curves more broadly to form a long, sharp-pointed, hooked fang. The space between the first and smaller second denticle is fairly wide. In fact the denticles are larger and there is more space between them than is depicted in the drawing. All the teeth are hooked and from the third denticle decrease in size slightly to the posterior end. The illustration suggests some sort of a flat surface at the posterior of the jaw. The area is actually convex and well rounded. The posterior margin is more broadly incurved than is shown in the drawing. This species is similar to other forms of the genus *Paleoenonites*.

Genus *Ildraites* Eller, 1936

Ildraites digitatus (Hinde)

?*Eunicites digitatus* Hinde, 1879: 376; pl. 19, fig. 13.

Although the illustration does not show it the first two denticles are elongate and point slightly forward. The remaining teeth are small, fairly blunt, and decrease slightly in size to the posterior end. The surface of the jaw is rounded and not angular as the drawing demonstrates. The opposite side that is hidden in the matrix contains the fossa which is probably fairly large in size.

Ilraites carinatus (Hinde)

Oenonites carinatus Hinde, 1879: 377; pl. 19, fig. 19.

The type specimen is broken and the figure does not resemble it very closely. The fang is wide and curves broadly to the outer margin instead of being straight and forming an angle as shown in the drawing. The outer margin is incurved and not straight as depicted. The shank is wide and would be fairly long if the end were not missing. A wide, deep bight is present between the shank and the jaw proper. Much of the posterior end is missing. The denticles are mostly missing or fragmentary. Hinde questioned placing this form in the genus *Oenonites*.

Ildraites cervicornis (Hinde)

Arabellites cervicornis Hinde, 1879: 379; pl. 19, fig. 8.

Although the illustration shows this specimen is not in perfect condition, it differs from the specimen in a number of details. The greatest dissimilarity is the size of the first denticle. The type specimen shows the fang to be long, wide, about three times the size of the second denticle, and twice the size of the third tooth. The anterior margin is incurved and forms a long, crescent-shaped shank. The posterior end is narrow and rounded and not acute as shown in the illustration. *Ildraites cervicornis* (Hinde) is very similar to *Ildraites horridus* Eller (1942: pl. 2, figs. 11, 12). They differ in the curvature of the anterior margin, the position of the shank, and the size of the third denticle. There is also a resemblance between *Ildraites cervicornis* (Hinde) and *Ildraites horridus* Eller (1940: pl. 6, figs. 6, 7, 9).

Ildraites pectinatus (Hinde)

Arabellites pectinatus Hinde, 1879: 379; pl. 19, fig. 11.

The delineator of this specimen depicted it as being complete. An examination of the type specimen shows the fang to be broken and much

of the shank to be missing. If the first denticle is projected from the broken edge to what was probably its full length and size it would be two to three times longer than the second tooth or any of the others. The remaining denticles are large, fairly uniform in size, sharp-pointed, and backward-directed. From about the middle of the outer margin the teeth become smaller and decrease in size to the posterior end. The type specimen suggests that the broken shank was long and curved and that it formed a deep bight with the outer margin. Forms of this sort are rather difficult to place generically since there is a resemblance to some species of *Lumbriconereites*.

Genus *Glycerites* Hinde, 1879

Glycerites sulcatus var. *excavatus* Hinde.

Glycerites sulcatus var. *excavatus* Hinde, 1879: 380; pl. 19, fig. 10.

This specimen is so poorly preserved that no attempt will be made to redescribe it.

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